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Hak-Sun [KR/KR]; Ggachi Maeul Apt. 1006-315, Ilwon-dong, Kangnam-ku, 135-230 Seoul (KR).

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(74) Agent: **YOU ME PATENT & LAW FIRM**; Tehran Bldg., 825-33, Yoksam-dong, Kangnam-ku, 135-080 Seoul (KR).

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(71) Applicant (for all designated States except US): **SAM-SUNG ELECTRONICS CO., LTD.** [KR/KR]; 416, Maetan-dong, Paldal-ku, 442-370 Suwon-city, Kyungki-do (KR).

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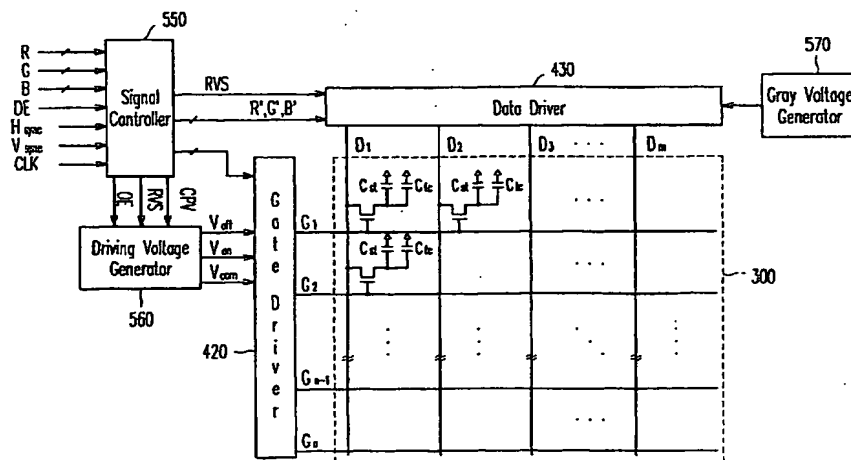
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(72) Inventors; and  
(75) Inventors/Applicants (for US only): **SONG, Jang-Kun** [KR/KR]; Samik Apt. 5-201, Seocho 4-dong, Seocho-ku, 137-778 Seoul (KR). **LEE, Chang-Hun** [KR/KR]; Shinnamushil Ssangyong Apt. 542-203, Youngtong-dong, Paldal-ku, 442-470 Suwon-city, Kyungki-do (KR). **CHANG,**

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[Continued on next page]

(54) Title: **LIQUID CRYSTAL DISPLAY AND DRIVING METHOD THEREOF**



(57) Abstract: The present invention relates a liquid crystal display. The liquid crystal display includes a liquid crystal panel assembly including a plurality of pixels arranged in a matrix, a gate driver applying gate signals to the pixels for application of data signals to the pixels, a data driver selecting gray voltages corresponding to gray signals and applying the selected gray voltages to the pixels as the data signals, and a signal controller providing the gray signals and control signals for controlling the gray signals for the gate driver and the data driver. The data signals include normal data signals and a black data signal. The data driver alternately applies the normal data signals and the black data signal to the pixels under control of the signal controller. A scanning direction of the normal data signals is opposite in adjacent frames. Accordingly, respective holding periods of all the pixels for the normal data signals and the black data signals are uniform, and then image quality of the LCD is uniformed to be improved.

**WO 2004/006008' A1**



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

특 허 협 력 조 약  
(PATENT COOPERATION TREATY)



PCT

발신 : 국제조사기관

수신 :

YOU ME Patent & Law Firm

Teheran Bldg., 825-33 Yoksam-dong, Kangnam-ku,  
Seoul 135-080, Republic of KOREA

국제조사보고서 또는 국제조사보고서  
부작성 선언서 송부 통지서

(PCT 규칙 44.1)

발송일 (일/월/년)	02 NOVEMBER 2002 (02.11.2002)
출원인 또는 대리인 서류참조기호 OPP020527KR	이후의 절차에 대하여는 아래 1. 및 4. 참조
국제출원번호 PCT/KR02/01743	국제출원일 (일/월/년) 17 SEPTEMBER 2002 (17.09.2002)
출원인 SAMSUNG ELECTRONICS CO., LTD. et al	

1. ☒ 국제보고서가 작성되어 이를 송부함을 출원인에게 통지합니다.  
조약 제19조의 규정에 의한 보정서 및 설명서의 제출:  
희망하는 경우 출원인은 국제출원의 청구의 범위를 보정할 수 있습니다.(조약규칙 46):  
기간 보정서 제출기간은 통상 국제조사보고서 송부일부터 2월.

제출처 The international Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland  
Faxcimile No. : (41-22) 740 14 35

보다 자세한 지침에 대하여는 첨부되는 용지에 기재된 설명을 참조.

2. ☐ 국제조사보고서가 작성되지 아니할 것이며 조약 제17조(2)(a)의 규정에 의한 선언서가 송부됨을 출원인에게 통지합니다.
3. ☐ 조약규칙 40.2의 규정에 의한 추가수수료 납부에 대한 이의신청과 관련하여 아래 사항을 출원인에게 통지합니다.
- ☐ 이의신청 및 이의신청에 대한 결정 통지서를 출원인이 제출한 이의신청 및 이의신청에 대한 결정 통지서의 지정관청에의 송부 신청서와 함께 국제사무국에 송부하였습니다.
  - ☐ 이의신청에 대한 결정이 아직 이루어지지 않았습니; 결정이 이루어지는 대로 출원인에게 통지할 것입니다.

4. 주의사항

우선일부터 18월 직후 국제사무국은 국제출원을 공개합니다. 공개를 하지 않거나 또는 연기할 것을 희망하는 경우에는 출원인은 국제공개의 기술적 준비가 완료되기 전에 각각의 경우에 따라 조약 규칙 90bis.1 및 90bis.3의 규정에 의한 국제출원 취하서 또는 우선권주장 취하서를 국제사무국에 제출하여야 합니다.

일부 지정관청에 대하여는 출원인이 우선일부터 30월까지 (일부관청에 대하여는 더 늦을 수도 있음) 국내단계의 개시를 연기하고자 하는 경우에는 우선일부터 19월 이내에 국제예비심사를 청구하여야 합니다; 그렇지 않은 경우 출원인은 우선일부터 20월 이내에 당해 지정관청에 대한 국내단계의 개시를 위한 규정된 절차를 밟아야 합니다.

다른 지정관청에 대하여는, 우선일부터 19월 이내에 국제예비심사를 청구하지 않더라도 30월(또는 더 늦을 수도 있음)의 기간이 적용될 것입니다.

서식 PCT/IB/301의 부속서류를 참조하기 바라며, 각 특허청마다의 적용기간에 대한 구체적인 사항은 PCT출원인 안내 제2권 국내단계 및 WIPO 인터넷 사이트를 참조하시기 바랍니다.

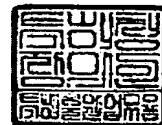
ISA/KR의 명칭 및 우편주소

대한민국 특허청  
302-701 대한민국 대전광역시 서구 둔산동  
920번지 정부대전청사

팩스 번호 82-42-472-7140

특허청장

전화번호 82-42-481-5208



서식 PCT/ISA/220 (2002년 4월)

**PATENT COOPERATION TREATY**  
**PCT**

**INTERNATIONAL SEARCH REPORT**

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>OPP020527KR</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/KR02/01743</b>	International filing date ( <i>day/month/year</i> ) <b>17 SEPTEMBER 2002 (17.09.2002)</b>	(Earliest) Priority Date ( <i>day/month/year</i> ) <b>05 JULY 2002 (05.07.2002)</b>
Applicant  <b>SAMSUNG ELECTRONICS CO., LTD. et al</b>		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (See Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawing to be published with the abstract is Figure No. 1

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

 International application No.  
PCT/KR02/01743
**A. CLASSIFICATION OF SUBJECT MATTER**

IPC7 G02F 1/133

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC7 G02F, G09G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NPS: "black", "bidirection"

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5790089 A (Seiko Epson Corporation) 4 August 1998 *the whole document*	1
A	US 6232939 B1 (Hitachi, Ltd.) 15 May 2001 *the whole document*	1
A	US 5546102 A (In Focus Scheffer) 13 August 1996 *the whole document*	1
A	US 5119089 A (Seiko Epson Corporation) 2 June 1992 *the whole document*	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family


Date of the actual completion of the international search

31 OCTOBER 2002 (31.10.2002)

Date of mailing of the international search report

31 OCTOBER 2002 (31.10.2002)

Name and mailing address of the ISA/KR

 Korean Intellectual Property Office  
920 Dunsan-dong, Seo-gu, Daejeon 302-701,  
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KOH, Jong Wook

Telephone No. 82-42-481-5989



**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
PCT/KR02/01743

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5790089 A	04-08-1998	None	
US 6232939 B1	15-05-2001	None	
US 5546102 A	13-08-1996	None	
US 5119089 A	02-06-1992	None	

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"&" document member of the same patent family

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Name and mailing address of the ISA/KR



Korean Intellectual Property Office  
920 Dunsan-dong, Seo-gu, Daejeon 302-701,  
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KOH, Jong Wook

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